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FARM & HOME SCIENCE



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Livestock Feeding Situation in Utah Relatively Favorable for 1943-44

SINCE last spring much concern has been expressed among farm leaders over the livestock feed situation in Utah for the 1943-44 feeding season. This concern arose in part from the fact that in certain parts of the state there was considerable killing of alfalfa last winter, and also because some damage was done by frost to the first cutting of hay. The local shortages of feeds, particularly of high protein supplements, for a time during the early summer greatly accentuated this concern. It is the purpose of this article to present the situation so far as the factual information is available.

It is not possible to draw definite conclusions regarding the adequacy of the livestock feed supply in Utah for the coming year because of the several important variables on which precise information cannot be obtained at present. However, the relationship between feeds produced in the state and the number of livestock is relatively favorable. The major problem in connection with the supply of feed is the uncertainty of being able to maintain normal shipments into the state of those feeds, particularly protein supplements, that must be brought in. The anticipated national supply of these feeds is reasonably adequate but difficulties in distribution may result in local shortages.

The feed situation in Utah is probably more favorable than in many parts of the nation. Strong demands for feed resulting from increased livestock numbers and favorable prices are in evidence throughout the nation. This may tend to keep feedstuffs from moving into the state and the especially strong demand on the west coast may draw more than the usual amount of feed out of Utah. While such a situation is not particularly alarming at present, it would be only good management for livestock and

By **GEORGE T. BLANCH**
poultrymen to insure as far as possible their requirements until next harvest.

Inasmuch as a normal supply of feed per animal unit in the state is fairly well assured for the coming year, the situation should turn out satisfactorily if no more than normal amounts are required. At any rate there seems to be no reason for any radical reduction in livestock numbers because of feed shortages. Normal cullings and marketings should of course be carried on but sound producing stock need not be disposed of. On the other hand, any expansion in numbers should be undertaken with caution and only where the necessary feed is definitely available.

Feed Production

The 1943 production of feed crops in Utah compares favorably in total volume with the production of past years (table 1). The 1943 production of hay, plus the May 1 carry-over, is expected to be 108 percent of the 1930-39 average and is also larger than either 1940 or 1942. The May 1 carry-over of hay in Utah in 1943 was 106,000 tons compared with 87,000 for 1930-39; 72,000 for 1940; 89,000 for 1941; and 73,000 for 1942.

While the production of hay has remained fairly constant the total production of feed grains has increased materially during the past few years. The 1943 total grain production in tons is expected to be 51 percent greater than the 10 year average. All grains have increased except wheat. The most important increase has been in barley, the 1943 production of which is expected to be 298 percent of the 1930-39 average. The 1943 production of all grains other than wheat was estimated on September 1 to be 240 percent of the 1930-39 average.

From the above it is evident that the total livestock feed produced in Utah in 1943 is greater than during the average of the period 1930-39 or during any succeeding year except probably 1941. The above data do not include all feeds fed to livestock but do include the major part. While the supply of some by-product feeds, particularly sugar beet pulp, will be less than normal this year, the shortage will probably be more than made up by increases in other by-product feeds such as aftermath in the fields, which is especially good this year.

More important, however, than the quantity of available by-products is the condition of pastures and ranges. The available information indicates that they have been better than normal and except for 1941 better than for any recent year. Not only have the ranges been in better than normal condition but also range livestock are going into the winter feeding period in better than average condition. However, some areas of winter range are in rather poor condition particularly in the southeastern part of the state.

Livestock Numbers

The exact number of livestock that will be dependent upon the 1943 feed production is not known. However, a summation of what information is available is also shown in table 1.

The available data indicate that the total animal units dependent upon the 1943 feed production are about 3 percent larger than for the average of the period 1930-39. The total is also larger than for 1940 and 1941 but is less than for 1942. The data show a decrease of about 3 percent from the 1930-39 level in the heavy forage consuming animals. This is because of a decrease in sheep numbers as cattle numbers increased.

All kinds of heavy grain consuming livestock increased between 1930-39 and

1943. The greatest increases were in hogs and turkeys. For the entire group the number of animal units just about doubled. The largest increases took place between 1941 and 1942 and between 1942 and 1943. It is not likely that this trend of increase will extend into 1944 as the government is now suggesting for 1944 a decrease of 17 percent in hogs, 4 percent in turkeys, 3 percent in farm chickens, and 20 percent in commercial broilers, and is somewhat adjusting the programs to bring that about. Some evidence is available which indicates that the reduction in hogs has already begun in this state. This, plus the difficulties encountered this past season in obtaining feed, is likely to prevent any material increase in the heavy grain consuming livestock.

The numbers of heavy forage consuming stock do not change so rapidly. The trends indicate that the number of milk cows may increase slightly but that this will be offset by slight reductions in sheep numbers and possibly in beef cattle. So it is not expected that the total number of units of heavy forage consuming animals in Utah will be materially larger in 1943-44 than in 1942-43.

Production of Feed Per Animal Unit

According to the available data the outlook for forage per animal unit for the coming year is 1.25 tons as compared to an average of 1.13 tons during the period 1930-39. Also the 1943 supply will be greater than for either 1940 or 1942. The larger supply of hay in 1943 is partially offset by a slightly larger proportion of the heavy forage consuming animals being milk cows and a smaller proportion being sheep. Most of the sheep in the state receive very little hay in comparison with dairy cows. For the 1930-39 period sheep made up 51.8 percent of the animal units in the heavy forage consuming group but only 48.8 percent in 1943. The percentage that was milk cows increased from 12.7 in 1930-39 to 13.8 in 1943. The heavy grain consuming animals also consume some hay and the number of these that will need to be fed in 1943 is much larger than in 1930-39. While each animal requires only a small amount of hay the total requirements are considerable.

The total grain produced per animal unit of heavy grain consuming animals in 1943 is only 76 percent of that in the 1930-39 period. This, however, is not as significant as it may at first appear as the decrease was largely in

Table 1. Livestock feed supply, number of animal units and feed supply per animal unit in Utah for 1943-44 compared with selected years

Item	Unit	Average of 1930-39	1940	1941	1942	1943	Percentage that 1943 is of 1930-39 average
Total feed supply:							
Total hay*	1000 tons	1,175	1,184	1,305	1,247	1,269	108
Total grain†	tons	246,646	315,500	383,754	335,212	372,692	151
Grain other than wheat‡	tons	90,436	151,520	172,944	184,912	217,052	240
Number of livestock:							
Heavy forage consuming§	1000 A.U.	1039.1	976.3	999.9	1044.5	1012.0	97
Heavy grain consuming§	1000 A.U.	56.7	71.8	70.7	95.0	112.8	199
Feed per animal unit:							
Hay per heavy forage consumer	tons per A.U.	1.13	1.21	1.30	1.19	1.25	111
Total grain per heavy grain consumer	lbs. per A.U.	8,700	8,789	10,855	7,057	6,608	76
Grain excl. wheat per heavy grain consumer	lbs. per A.U.	3,190	4,221	4,891	3,893	3,848	141

*Years production of alfalfa, other tame hay and wild hay plus May 1 carry-over. Production for 1943 based on the October 1, estimate.

†Years production only. Production for 1943 based on the October 1, estimate.

‡Includes all horses, cattle and sheep. Conversion to animal units was made on the basis of a 0.94 animal units per head of horses; 0.83 per head of cattle other than milk cows; 1.25 per head of milk cows; and 0.20 per head of sheep.

§Includes all pigs, chickens and turkeys. Conversion to animal units was made on the basis of 0.25 animal units for each brood sow; 0.15 for each pig saved; 0.01 for each chicken on farms January 1; 0.002 for each chicken raised; and 0.015 for each turkey raised.

Based on reports of U. S. Bureau of Agricultural Economics. For a few items it was necessary to do some estimating.

wheat, only a part of which is fed to livestock. Also, if additional wheat is desired for feed, supplies are available either from southern Idaho or from "government wheat." Normally plenty of wheat is available from Idaho and usually much of this passes through Ogden during the marketing process. However, livestock feeders must compete with other types of users for this wheat.

If wheat is entirely excluded from consideration as a feed grain the 1943 production would amount to 3,848 pounds per animal unit of heavy grain consuming animals as compared to 3,190 pounds for the 1930-39 average. This is a 21 percent increase. However, the 1943 supply is not so large as in 1940, 1941 or 1942.

Another factor that will have a bearing on the adequacy of the grain supply for 1943 is the amount that is fed to the heavy forage consuming animals, especially milk cows, fattening stock, and horses. The numbers of milk cows have increased some and available information indicates the rate of grain feeding has increased even more. The grain fed to horses probably will not change much. The amount of grain that may be used for fattening beef cattle or sheep is difficult to forecast as it is influenced by several factors. However, a rational wartime food program would

tend to restrict fattening operations. The present national program recognizes this but directly has done little about it. However, the present outlook is for less than the normal numbers of livestock to be placed in feed lots in Utah this coming year.

Imports and Exports of Feed

From all information that is available it appears that the feed supply for livestock feeding in Utah for next year will be fully as good as normal provided normal import and export balances are maintained. However, the uncertainty of being able to do this probably constitutes the most serious problem in the entire feed situation. Price relationships that are poorly adjusted but fixed, increases in numbers of livestock in other areas, smaller supplies of feed in some important producing areas, increased demands for other uses, transportation difficulties, rationing, and black market operations are some of the factors that lend uncertainty to the movement of feed supplies. Considerable quantities of "government wheat" have been fed the past couple of years. (Between July 1942 and July 1943, about 4,500,000 bushels were distributed in Utah. Much of the increase in hog and turkey production can, no doubt, be attributed to the availability of this cheap feed.) This

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NEW POISONOUS WEED INVADES WESTERN RANGES

New Plant Introduced From Siberia and
Poisonous to Sheep Spreading Rapidly
in Three Western States

By ARTHUR H. HOLMGREN

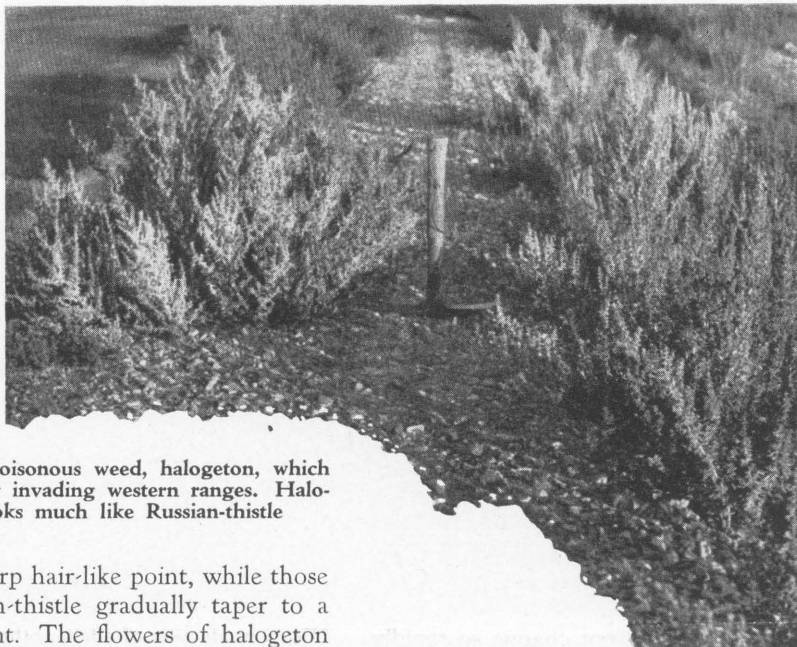
ROADSIDES throughout the grazing ranges of Utah are rapidly being invaded by a recently introduced poisonous weed which has entered western Utah from Elko County, Nevada. The weed, introduced from Siberia, is botanically known as **Halogeton glomeratus** (M. Bieb.) C. A. Mey. and has no acceptable common name. In view of this and the need of a common name for a plant of such tremendous economic importance the generic name, **Halogeton**, is proposed.

Halogeton was first collected in this country by Ben Stahmann of the U. S. Forest Service at Wells, Nevada, in August 1935. In 1937 it apparently was still confined to Wells and immediate vicinity, occupying an area of approximately a twenty-five mile radius around Wells. This indicates that the place of introduction was in Wells or a nearby ranch. At the present time halogeton is known from three states and can be expected to become as generally distributed as Russian-thistle and other introduced weeds on our Western ranges.

In Nevada halogeton is known from Elko, White Pine, Eureka, Lander, Humboldt, and Pershing Counties; in Utah from Box Elder, Tooele, Juab, and Millard Counties; and in Wyoming from Big Horn County. A detailed survey would undoubtedly add other counties to the known distribution in this country.

Halogeton belongs to the goosefoot family (Chenopodiaceae) which contains plants familiar to the farmer and range livestock man. It includes such plants as sugar beets, white sage, greasewood, and Russian-thistle. It is evident then that halogeton belongs to a family which is well adapted to desert conditions and generally tolerates considerable amounts of alkali.

Halogeton has a close relative in Russian-thistle and is frequently mistaken for it by livestock men. It may be distinguished from Russian-thistle by several easily recognized characters. The leaves in both halogeton and in Russian-thistle are round in cross sections, however in halogeton the leaves end abrupt-



The new poisonous weed, halogeton, which is rapidly invading western ranges. Halogeton looks much like Russian-thistle

ly in a sharp hair-like point, while those of Russian-thistle gradually taper to a sharp point. The flowers of halogeton are without the three bracts which together with the leaves make Russian-thistle so unpleasant to the touch. In the spring halogeton has a bluish color, while Russian-thistle is green. As the season advances halogeton usually becomes more or less reddish, while Russian-thistle becomes purplish.

Halogeton is a prolific seed producer. At maturity the winged cover around the seeds is conspicuous. Numerous seeds and winged bracts enclosing them often form a solid mass from the ground to the tips of each branch to the extent that the fleshy leaves are entirely hidden from view. The embryo, or germ, of the seed is spirally coiled as in Russian-thistle. Halogeton seeds germinate quickly when optimum moisture conditions exist. The number of rainstorms throughout the season could be rather accurately counted by the successive stories of halogeton which extend in step-like fashion from the roadsides.

Halogeton is primarily a roadside weed, although it is occasionally found considerable distances from roads in newly disturbed areas. A good stand of native vegetation seems to be an effective barrier to migration away from the frequently disturbed roadsides, although a few radiating tongues are to be found here and there on wind-swept points. As a roadside weed the plant has been rapidly spread by highway equipment, especially road graders, which pick up myriads of seeds in heavily infested areas and then plant them along the way. Halogeton is highly adaptable to different types of soil, being found in alkali places in bottom lands to areas well up into the aspen of our higher

mountains, but reaches its best development in shadscale types where considerable amounts of alkali are present and the number of competitors much reduced.

Probably the most important feature of halogeton is its poisonous nature. Chemical analysis of the plant shows considerable amounts of oxalates to be present. The amount increases as the growing season advances. Late in the fall as much as 20 percent of the total dry matter of the plant is oxalic crystals, and much of it in a water soluble form. This undoubtedly explains why the plants are less toxic after fall rains and especially so after the first winter thaw. The crystals are large enough to be readily perceptible with an ordinary hand lens.

There have been several losses of sheep in Nevada from excessive grazing along roadsides where halogeton occurs in dense colonies. These losses are usually in the fall of the year just preceding fall rains. After the first winter thaw the plants can be utilized without much danger.

Professor C. E. Fleming, in charge of Range Management, Nevada Agricultural Experiment Station, discovered the poisonous properties of halogeton in 1942. Subsequent feeding tests have confirmed his original conclusions. Mr. Fleming and other staff members of the Nevada Station are carrying on feeding and chemical tests which will undoubtedly be published in the near future. Both sheep and cattle are being used in the studies, although no definite cattle

(Continued on page 11)

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R. H. WALKER, Director
GLADYS L. HARRISON, Editor

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More detailed information on the subjects discussed here can often be found in Station bulletins and circulars or may be had through correspondence.

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SCIENTIFIC RESEARCH IN WAR AND PEACE

AGRICULTURAL science was tooled and ready for an all time record in the production of food and feed crops when the war started. For years past the agricultural experiment stations together with the U. S. Department of Agriculture through scientific investigation and experimentation had been making new developments in agricultural science which in turn have made increased production possible.

Vice President Wallace stated recently, "It is only because of the great advances in technological developments in soil management, crop varieties and production, and livestock feeding that we have in the last year been able to ship such huge supplies of food to our allies and military forces, and at the same time furnish our civilian population."

Numerous scientific developments of the research laboratories and experimental fields are now contributing to the war effort, but only two of these will be named here. These are hybrid corn and penicillin.

The use of hybrid seed added approximately 600,000,000 bushels to the 1943 corn crop. That is enough corn to produce about 6,000,000,000 pounds of pork. If this corn were used for human consumption it would be sufficient to supply the necessary calories of energy for some 13 million men for a period of 3 years. This would be more than enough for our entire military force for this period.

Hybrid corn was developed through scientific research in the laboratories of experiment stations, with the research workers of many states contributing to the final result as we know it today. Technical studies in plant breeding, and on the character and composition of the chromosomes of the corn seed were a

necessary forerunner to the development of hybrid corn.

Penicillin, the new drug that is so powerful and that is now being used so widely in this war in the treatment of wounds and in combating disease, is produced by a fungus organism commonly found in the soil. Soil scientists and bacteriologists have studied this and related organisms for years in the research laboratories. They have learned how to isolate it from the soil and grow it in test tubes. And more recently through experimentation they have learned how to grow the fungus on a large scale and with a high degree of efficiency in the production of penicillin.

It is clear, therefore, that even though the scientists in their laboratories may appear to the layman to be doing work that is nonessential to the war effort, yet they may be making heroic contributions, the value of which may be measured actually in human life itself. Furthermore, as was pointed out recently by Dr. E. C. Auchter, administrator of Agricultural Research, U. S. Department of Agriculture, all the funds spent on agricultural research for many years past could be justified by either of these two discoveries alone, for penicillin will undoubtedly save the lives of thousands of soldiers and the increased production of corn will help feed thousands of starving people of the world.

Scientific research looks ahead to solve the problems of tomorrow today. It has done much to aid in the prosecution and winning of the war. Research should be fostered and supported generously in the future, both morally and financially, so it can make the contribution we shall need in winning a lasting peace for mankind.—R. H. Walker.

The enlarged research program in animal husbandry made possible by the increased appropriation of the last legislature has made necessary an addition in personnel. Two new members, Dr. D. A. Bell and Wayne C. Cook, have been added to the staff and are stationed at the Branch Agricultural College, as much of this work is being conducted in the vicinity of Cedar City.

Dr. Bell, assistant professor of animal husbandry, comes to the Station from Texas A. and M. College. He has also been on the animal husbandry staff at New Mexico State College. Dr. Bell was raised on a sheep ranch in Idaho, graduated with the B.S. and M.S. degrees from the University of Idaho and received his Ph.D. degree from the University of Wisconsin. He has also had veterinary science training at Washington State College.

Mr. Cook is a graduate of Kansas State College. He worked for his master's degree at Utah State and has been on the staff of the School of Forestry here. He has charge of the range management phases of the work at Cedar City.

THE AUTHORS

Because of the concern over the feed situation by feeders throughout the state and the many reports of shortages, especially in protein supplements, Dr. George T. Blanch of the Department of Agricultural Economics has made an intensive study of the situation and reports his findings in this issue. Dr. Blanch has been on the staff of the Department of Agricultural Economics since 1934 and is the author of a number of bulletins.

Arthur H. Holmgren is the new curator of the Intermountain Herbarium, replacing Dr. Bassett Maguire who left to become curator of the Herbarium at the New York Botanical Gardens. Mr. Holmgren is the author of a "Handbook of the vascular plants of northeastern Nevada," published in 1942. He is now cooperating with Dr. Maguire and the New York Botanical Gardens in gathering material and preparing publications on the flora of Utah and of the Intermountain region.

John V. Christensen received both his B.S. and M.S. degrees in animal husbandry from Utah State and taught at the Branch College at Cedar City. He has replaced Leroy Van Horn, who accepted a position at Montana State College.

Alma C. Esplin divides his time between extension, teaching and research. He has been connected with the college since 1925 and is known throughout the intermountain country as an authority on sheep and wool.

Professor D. W. Pittman arrived home from Iran in time to start work at the beginning of the fall quarter. Three years ago Prof. and Mrs. Pittman (formerly librarian and bulletin editor at the Utah Station) left Logan and flew across the Pacific via the Philippines, China and India to Iran, where Prof. Pittman assumed the position of adviser on agriculture to the Iranian government. Then a large part of the world was at war, but the route across the Pacific was comparatively safe. Still they had to fly some of the way in China at night to avoid Japanese guns. But between that time and the time they were ready to return Pearl Harbor occurred and the entire world became a danger zone. Mrs. Pittman left Iran a year ago the last of September and was en route home four months, arriving in New York the latter part of January. Prof. Pittman stayed in Iran until June 1943. He arrived in Logan in September, spending three months en route this past summer. Both of them came through the Indian Ocean around the southern tips of Africa and South America, up the west coast of South America, through the Panama Canal and landed in New York City.

Dr. L. A. Stoddart, head of the Department of Range Management, is the author of a new college text on range management published by Mc-Graw-Hill. A number of other articles have appeared under his name in previous issues of Farm and Home Science.

Dr. Ethelwyn B. Wilcox, new staff member in nutrition, came to the Utah Station this summer from the State College of Washington. Dr. Wilcox is a native of Iowa and a graduate of Iowa State. She is working with Mrs. Brown in studies on the vitamin content of Utah fruits and vegetables.

Dr. Dean F. McAllister, federal collaborator in the grass breeding investigations, has received a commission in the Army Air Corps. Mr. Harry Goodloe has been appointed to continue the work during Dr. McAllister's absence.

Sampling of Wool Best Method of Determining Shrinkage

Sampling of Individual Fleeces Also Helpful in Selecting Breeding Stock

By JOHN V. CHRISTENSEN
and ALMA C. ESPLIN

WOOL shrinkage studies carried on by the Station during the past year continue to point out the need for sampling the clips of each grower in order to determine a fair market price for wool. They also give convincing evidence to show that breeding stock should be selected for length of staple as well as weight of fleece.

A fleece of wool, when it is shorn from a sheep, is known as grease wool and contains a considerable quantity of dirt, grease, vegetable matter, and other foreign material. The first step in the manufacturing of wool fabric is the separating of this extraneous material from the wool fiber. This process is known as wool scouring. The weight the grease wool loses when it is scoured, expressed as a percentage of the original weight, is termed the shrinkage. The fact that the manufacturer of wool fabrics is interested only in the clean wool has led to the practice of wool buyers purchasing wool clips on a basis of estimated shrinkages. Such a method of purchase has been seriously questioned by various wool investigators as well as many wool growers. The consensus is that the buyers' estimate of shrinkage, made merely from an examination of the grease wool, does not place an accurate value on a wool clip.

The problem facing wool investigators has been to devise a method of sampling clips for determining actual shrinkages that will be accepted by the wool buyer as well as the wool grower. It is impossible for growers to obtain actual shrinkage figures on individual clips of wool from manufacturers. In processing, clips of wool are not scoured separately but are sorted and combined with other wools in such a way that the identity of an individual clip is lost.

Various investigational agencies have developed methods of sampling clips of wool as well as individual fleeces for shrinkage determinations. The methods used by investigators at the Utah Agricultural Experiment Station are known as composite sampling for sampling herds of sheep and side sampling for sampling individual sheep, particularly of purebred breeding.

In the composite method of sampling, usually fifty fleeces in a herd of two thousand ewes are selected at random. From this random selection a few handfuls of wool are taken from various parts of each fleece and placed in sample bags

by grades. In cases where the herd is not uniform, that is, where several grades of wool are produced, the number of fleeces sampled is considerably increased. During the 1943 shearing season 25 herds of sheep from various parts of the state were sampled by this method. The samples thus obtained were scoured at the Experiment Station's wool laboratory by a process that closely approximates the commercial wool scouring method. The scouring results show a wide range in shrinkage, even within the same grade, as shown in table 1.

From the table it should not be assumed that high shrinkage figures necessarily mean low production in clean weight of fleeces. For instance, a 16.8 pound fleece shrinking 62 percent yields the same amount of clean wool as a 13 pound fleece shrinking 50 percent, namely 6.5 pounds of clean wool. However, the logic of the recommendations toward production of heavy fleeces of light shrinking wool is brought out from the following report to a grower: The heaviest 10 fleeces and the lightest 10 fleeces from a herd were sampled, scoured, and the results tabulated. There was a 6.8 pounds difference in grease fleece weight and a 2.6 pounds difference in clean fleece weight. Based on current wool prices there was an average of \$3.04 difference in return per ewe from wool in favor of the heavy producing group. These figures illustrate the great variation in production that exists between individual ewes within the same herd.

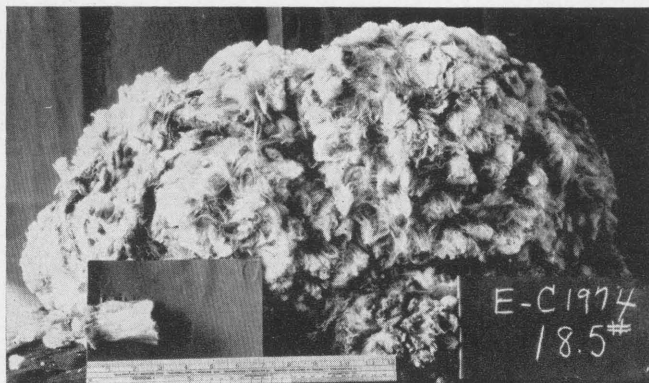
In the side sampling method samples ranging between one-half and one pound in weight are taken from the

side of the fleece immediately after shearing and before the fleece is tied. From these samples the shrinkage is obtained by the same method of scouring used with composite samples. The length of staple, grade, and other wool characteristics are also obtained.

During the past year four purebred flocks of Rambouillets, a total of 373 sheep, have been sampled. The shrinkage figure as determined from the side sample of each fleece was used to calculate the scoured or clean weight of the individual fleece. Some interesting figures on the variation, not only between individual sheep but also between flocks were made evident by this work. The variation in important factors affecting production is shown in table 2. These figures show quite conclusively that breeders of purebred sheep still have plenty of chance to select toward higher production by emphasizing heavy shearing sheep yielding a high percentage of clean wool of uniformly long staple length. The old type ram, short stapled, greasy fleeced, and wrinkly bodied, is not suited for present day wool production. Although these rams are generally heavy shearers they cannot be expected to increase or even maintain moderately high wool production on a clean basis when bred to the average run of range ewes. Wrinkled sheep may tend to produce more pounds of grease wool but their fleeces have a much higher shrinkage.

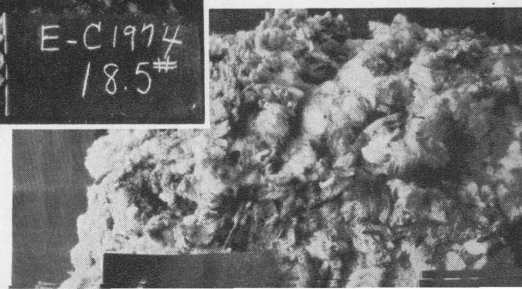
The relationship of staple length to both grease and scoured weight of fleeces as well as to shrinkage presents an interesting study. The ten fleeces with the longest staple length were compared with the ten with the shortest staple from each flock. Comparisons were based on the average grease

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Left. The aim of the sheep breeder: a large fleece, light shrinkage and good staple

Below. An average fleece: lighter weight, heavier shrinkage and shorter staple



OBSERVATIONS ON AGRICULTURE IN IRAN

By D. W. PITTMAN

THE agriculture of Iran (more familiar to most of us by its former name of Persia), as I observed it in nearly three years' service with the Iranian Ministry of Agriculture, is in many respects similar to the agriculture of the southwestern desert states with a small piece of Louisiana thrown in and the whole with rather an oriental cast. Some of our major cultivated crops, such as alfalfa, probably originated in Iran.

Iran lies between Mt. Ararat, the south end of the Caspian Sea and the Turkoman dry plains of the U.S.S.R. on the north, the Persian Gulf on the south, and between the hot desert plains of the Tigris and Euphrates Valley on the west, and the mountains of Afghanistan and Baluchistan on the east. Turkey touches the northwest corner and India is adjacent to the southeast.

The country is remarkably similar to Utah and Arizona—the same steep, rugged mountains, the same high desert basin between the mountains, and the same red sandstone cliffs and hills interspersed with grey adobe saline valleys. Kouzistan, the country near the head of the Persian Gulf, between the high Zagros Mountains and the sea, is a low desert plain hotter than any place here, except perhaps Death Valley. Nearly all of this part of the country is arid with an annual precipitation of about 4 to 9 inches—nearly all in the winter—except on the high mountains where there is considerable snow. Mazanderan, a narrow strip of the country between the south end of the Caspian Sea, which is about 85 feet below sea level, and the high Elburz Mountains to the south, is hot and humid with a precipitation of approximately 56 inches per year. The deserts are clothed, if at all, with the same, or similar, sagebrush and greasewood as ours and the stony hills with the same junipers, but the mountains are lacking any extensive development of spruce or pine. The north (humid) side of the Elburz Mountains facing the Caspian has a moderate growth of beech, oak, and other deciduous broadleaf trees which are mostly used for charcoal in this land of little fuel.

Great Diversity of Crops Grown

There is great diversity of crops in Iran. Wheat and barley are the chief grain crops in all the desert sections. They are mostly raised by irrigation, though in some areas considerable dry-

farming is practiced. The wheat is nearly all winter wheat and much of the barley is winter barley. Perhaps winter-hardy spring wheat and barley are more correct terms since the winters in most areas are not sufficiently severe really to stop the growth of the plant between the time of fall seeding and of early summer harvest. Under irrigation as much wheat is planted as can be adequately irrigated in June when the wheat needs its last watering and then enough barley which matures earlier is planted to make use of the more abundant early spring water which is not needed for other crops. Both for irrigated and dry land ("daim") grain, the only rotation used is one crop of grain followed by two or three years of uncultivated fallow or rest for the land. Adjacent to each village there is usually available three or four times as much good grain land as can be served by the water available and only about one-third to one-fourth of the land is used each year. Since usually all the land of each village, or several villages, belongs to one man and the villagers are simply share croppers with no permanency of tenure the problem of distribution is easily handled. In only a few areas, such as in the vicinity of Isfahan and Yazd, is the land divided into small individual holdings. It is interesting to note that the men of these districts are considered to be the best farmers in Iran.

In humid Mazanderan, rice (flooded by irrigation) is the principal crop. Rice makes up a large part of the diet of all the people of Iran, except in the poorer villages. Formerly considerable rice was also grown in Kouzistan. Its culture there was forbidden by the former Shah in order to reduce malaria in this district, but it is slowly being established again. Studies in India show that while the culture of rice will usually increase the number of malarial mosquitoes in a district, yet, because the people are better fed, the actual amount of sickness resulting from malaria may be decreased.

Caster beans, cotton, tobacco, poppies for opium, jute, sesame, broad beans, sorghum and broom corn are some of the more extensively grown field crops in the irrigated areas. Occasional patches are devoted to odd or unusual crops, such as tumeric. Sugar beets are grown in several areas where factories have been established. The spinning of the



Threshing wheat with oxen

A well made plow of the Irani type

A tribal woman milks a ewe

A camel caravan loaded with straw

cotton and processing of the tobacco are also done in local factories. Mulberries for silkworms are a major crop in certain areas, especially on the south shore of the Caspian where silk production is an important industry.

Of fruits and vegetables, there is a great variety. In Kouzistan and the hot lower valleys the date is the principal—and for many villages the only—crop. Fresh dates in Kouzistan are remarkably fine. Of the mild-climate fruits, figs, pomegranates, citrus fruits of all kinds except grapefruit, quince, persimmon, and grapes both for wine and raisins are all grown in large quantities. The apple, pear, peach, plum, cherry, and apricot are also produced in abundance as well as small fruit such as strawberries and blackberries.

Of vegetables, the Persian melon is probably most extensively cultivated and reaches perfection here. Other types of muskmelon and watermelon are also grown. Cucumbers, cabbage, cauliflower, eggplant, tomatoes, spinach, leeks, onions, beans, peas, carrots, sweet corn are all abundant, but only small amounts of asparagus and rhubarb are grown. Potatoes are grown only in the cooler areas.

Forage crops are not grown to any extent in Iran. The climate is such that sheep, work oxen, camels, asses, and their few small dairy cows can pick up a living outside during the entire year and little attention is paid to feeding stock. While alfalfa is said to have originated here, but little is grown now. The alfalfa weevil is bad in most districts, and since the hay is cut with a hand sickle it is impossible to clear a large area at one time so as to expose the weevil to the sun to kill it. For this reason, shabdar (Persian clover) and sainfoin, which are not attacked by the weevil, are usually preferred.

Livestock of Iran

On the desert range land fat-tail sheep are the principal livestock, with smaller numbers of goats, camels, asses, and ponies. Work oxen and buffalo and dairy cows are usually pastured on the swampy lowlands. The fat-tail sheep is a peculiar animal which builds up a great disk of soft watery fat on its tail, amounting in some cases to 10 or 15 percent of the weight of the carcass. This fat serves the same purpose as the hump on a camel in enabling the animal to go for long periods without food or water. The mutton of the fat-tail sheep is not strong, which is said to be because the fat is concentrated on the tail rather



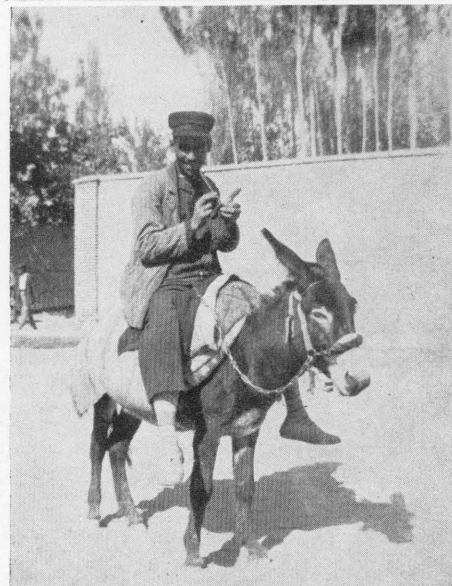
Pomegranates come to market by ass

than distributed throughout the carcass. The wool is coarse and long and especially adapted to the carpets for which Iran is famous.

The nomadic tribesmen who herd the stock in the hills are good horsemen and great fighters. Although when well armed—as they now are—they are really the best protection for Iran from outside invaders, they are rather dreaded by the peaceful valley farmers because of their frequent raids for robbery and slaughter.

The system of irrigation in Iran is unique in that most of the water comes from the mountains, not by reservoirs or surface diversions but by a system of laboriously constructed, unlined, underground tunnels called **kanats**, leading down from near the base of the mountain (where they tap underground springs) to the surface of the valleys below. Perhaps over 80 percent of the irrigation and drinking water of Iran comes from these kanats which enable villages and cities to be established in most hopeless looking desert areas.

Methods of farming in Iran are still as primitive as in Old Testament days. Grain is cut with a sickle and threshed by trampling oxen. A primitive wooden plow pulled by oxen is practically the only tillage implement and there are no cultivated crops in our sense of the word. Sugar beets are sown broadcast like wheat and dug with a spade. I have seen mixed plantings of castor beans, cotton, and sugar beets all sown broadcast in the same field and each plant tended individually where it hap-



A Iranian farmer comes to town

pened to be. The farmers work squatting on their heels, rather than standing up. The ass is almost the only means of transport for short hauls. In order to increase their production per man and improve their general standard of living, the Iranians have much need for our modern equipment, but modernization should be undertaken gradually and accompanied by more extensive irrigation development (which is possible) in order to avoid throwing many people out of work.

On the other hand, we can learn much from the people of Iran in the art of handling small quantities of water with little waste and especially in the art of getting water from buried springs near the base of seemingly dry mountains.



Water development is one of the major needs of the western range lands, especially in obtaining good distribution of animals

THIS is the third of a series of articles reporting findings on the opportunities for development and stabilization of agriculture in the Wasatch Front area of Utah during the war and post-war periods. Other phases of this study will be published in future issues of "Farm and Home Science."

The agricultural study is one part of a larger study which includes chapters on industrial development, water and power, transportation, recreation and rehabilitation, public works, and community planning. The study was published by the Utah State Department of Publicity and Industrial Development.

By L. A. STODDART

K EEN appreciation of America's range resources has arisen as a result of their role in national defense. Their importance in production both now and in the post-war period will bring about greatly stimulated interest in conservation and management of these extensive lands. In order to benefit from this increased interest, Utah should have concrete plans for development, protection, and management of range lands in the post-war period. To meet this need, the Utah Agricultural Experiment Station in cooperation with the National Resources Planning Board and the Utah Department of Publicity and Industrial Development has developed preliminary plans for the Wasatch Front ranges, including those

PLANNING THE USE OF RANGE LANDS IN THE WASATCH FRONT AREA OF UTAH

Vast Acreage of Range Land in this Area Makes Proper Management and Development Practices Essential to Adequate Utilization of Resources

lands in Box Elder, Tooele, Utah, Salt Lake, Weber, Davis, Morgan, Rich, and Cache Counties and those parts of Summit and Wasatch Counties which drain into the Great Basin.

This area, in point of acreage, is primarily a range livestock area which furnishes yearlong forage to large herds of breeding cattle and sheep. Most of the marketable product is "feeder" stock which is shipped elsewhere for fattening. Both climate and topography are such that most of the area will never be used for any other phase of agriculture, hence, the use of the range land becomes a ruling factor in determining the best use of the cultivated lands which must furnish feed necessary to a balanced operation of range livestock. The needed versatility and stability of the livestock industry depends upon a coordinated and planned program of use involving all land in the area.

In post-war planning for the range livestock industry in northwestern Utah primary importance should be given improved feed conditions on both range and farm lands. Careful grazing gives more and better quality feed on the range. Adequate high quality farm-grown feed will enable ranchers to

supply supplement to reproducing ewes and cows and also to remove animals from the range when natural forage is unavailable because of drought, heavy snows, or overgrazing.

Improved range forage can be obtained economically through a program of good management, artificial seeding, and development, especially water development. Good management involves correct numbers, which is of first importance, correct season of use, improved distribution, and good livestock husbandry.

Appraisal of the grazing capacity of northwestern Utah as shown by quantity and quality analysis of forage, together with performance tests, shows the 13½ million acres, 10 million acres of which is range land, to have the capacity to furnish range forage to the extent of 1,755,968 animal unit months (one cow with calf or 5 ewes with lambs are considered as one animal unit) (table 1). This is roughly 5.6 acres of range per animal unit month of grazing. Locally, production is materially decreased by competition from big game, insects, and rodents.

Although it is impossible to determine accurately present stocking on

Table 1. Grazing capacity in animal unit months for range lands in northwestern Utah, 1942

	Acres	Acres per animal unit month	Animal unit months grazing capacity
Private and state land	5,680,343	4.72	1,203,285
Forest Service land	1,112,500*	6.16	180,551
Grazing Service land	3,327,373	9.10	365,735
Other federal land	58,190	9.10	6,397
Total or average	10,178,406	5.80	1,755,968

*Estimated acreage actually grazed.

Table 2. Seasonal distribution of grazing capacity of range lands of northwestern Utah

	Acres	Acres per animal unit month*	Grazing capacity in animal unit months*	Grazing capacity in animal unit months per month usable†
Summer range	2,575,137	4.50	572,080	163,451
Winter range	2,880,489	7.56	380,810	108,803
Spring-fall range	4,010,292	5.60	716,018	143,204
Yearlong range	712,488	8.18	87,060	7,255
Total	10,178,406	5.80	1,755,968

*One cow with calf or 5 ewes with lambs

†Based on use periods as follows:

Summer range—3½ months use
Winter range—3½ months use

Spring-fall range—5 months use
Yearlong range—12 months use

these ranges, probably much of the area is overstocked. It is estimated that there is 15 to 20 percent too many animals for present conditions. By improved distribution through water development, it is altogether possible that current numbers can be supported after a period of readjustment.

Study brings to light a serious lack of balance in seasonal supply of range forage in this area (table 2). Deficiency of winter range is overcome effectively by trailing sheep to other areas and by feeding cattle on farm lands but deficiency of spring-fall range has resulted in heavy use of the available range land and poor nutrition in range animals. Increasing the spring forage by developing irrigated pastures, planting dry-land farms to grasses, and by devoting increased acreages of farm land to forage crops would result in greatly increased production of range livestock and would add immeasurably to the stability of the industry.

Obtaining proper distribution of livestock on the range is of great importance in obtaining maximum production of meat and wool, since overuse of local areas may force the owner to remove animals long before full use is made of the range. Especially with cattle, good distribution is difficult to effect. Development of an adequate and dependable supply of livestock water is the most important problem in obtaining good distribution of stock. Plenty of well located fences and careful attention to salting, herding, and trailing are essential. Reduced sheep trailing is especially important.

Good livestock husbandry and use of good stock are basic requisites to maximum range production. Good quality in the animal means not only higher production per animal but also better prices. Although it is doubtful if purebred herds have a place on range lands in northwestern Utah, with but few exceptions, there is real need for improving herds, especially cattle. A program of breeding-up the herds and of close culling seems necessary.

Economically, increasing calf and lamb crops are of primary importance in this area. Calf crops of about 80 percent and lamb crops of 90 to 100 percent are easily possible under range conditions. Production below these levels should be investigated carefully and efforts made to improve efficiency. Controlled seasonal breeding, adequate males, use of good breeding pastures, and plenty of feed at both breeding,

and calving and lambing time will increase production materially.

Recommendations

After study of the above problems and consultation with technicians from federal range administering agencies, the following recommendations are advanced for consideration in post-war readjustment:

(1) There is definite need for land-use planning and zoning of land in

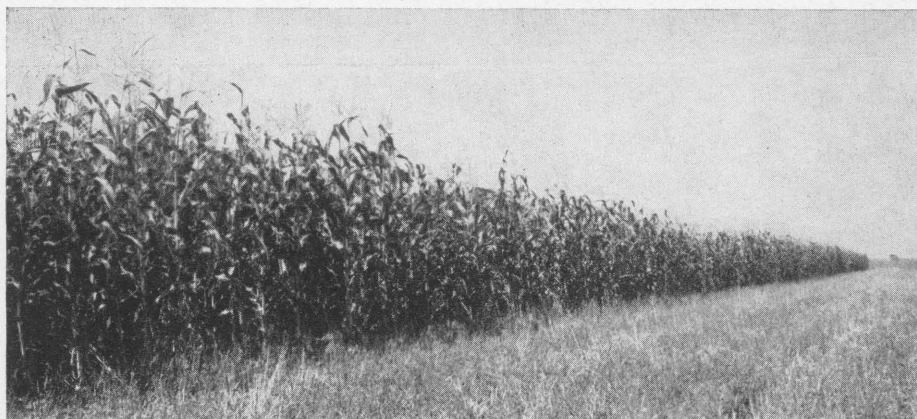
northwestern Utah. Careful study is recommended to cover all lands and to be conducted by experts in all phases of agriculture. This study would result in zonation of land showing which lands should be devoted to irrigated farming, which to dry farming, which farm land should be devoted solely to forage production, which range lands should be retired from agricultural production.

(2) Especial attention should be given

Top. Good farm forage is necessary to balance range resources in Utah.

Middle. Abandoned farm lands such as this are abundant in Utah. These support annual weeds such as bromegrass and Russian-thistle. Seeding to cultivated grasses such as crested wheatgrass may increase their grazing value manyfold

Bottom. Summer range lands in northwestern Utah are high producing and contribute greatly to meat production. These lands are of even greater importance, however, as watersheds from whence comes water for irrigation, culinary, and industrial use in the valleys below



the following factors which increase the number of calves or lambs and the quality of these animals:

- (a) Use of adequate numbers of bulls and rams.
- (b) Use of purebred bulls and rams
- (c) Use of small breeding pastures where topography is relatively level and where feed is abundant
- (d) Use of a definite breeding season and elimination of animals not breeding during that season
- (e) Careful attention to herds during calving and lambing
- (f) Use of supplemental feed both before and after calving or lambing
- (g) A careful educational program is desirable to help livestock growers to better their herds and their management practices

(3) Development of adequate high quality feed for livestock is the most important need of the livestock industry of northwestern Utah. Many of the range feed problems can be solved by cooperative and planned action by federal range administering agencies and livestock operators. Study and supervision for such an action program might be undertaken by a group of representa-

tives from the Forest Service, Grazing Service, Soil Conservation Service, Agricultural Adjustment Administration, and the Utah State Agricultural College, together with representatives from the sheep and cattle growers organizations.

(4) Development of range land is an important and worthy work project in the post-war construction program. Such a program would include building driveways and stock shelters, fencing, and especially construction of numerous and dependable stock watering facilities.

(5) There exists a serious problem in equality of taxation and in grazing costs on private range land compared to costs of grazing on federal ranges. Much of this problem arises as a result of low fees on federal range and resulting false values of private land usable as base property for obtaining public land use. This problem can be solved only by comprehensive economic studies of costs and values followed by an unprejudiced revision of public grazing fees and tax levies on private lands.

(6) Since the mountainous range lands of northwestern Utah are the source of highly valuable irrigation, industrial, and culinary water, maintaining water production at its highest quality and quantity is a primary problem of range management. Good range man-

agement and afforestation practices are thoroughly compatible with erosion control and water production; only in emergencies are expensive erosion control practices needed or justifiable. Only in a few areas is elimination of grazing necessary to proper conservation.

(7) Competition for range forage by big-game animals is locally so serious, especially on critical spring ranges, that it is recommended that big game be reduced to about 75 percent of present numbers. Intensive control campaigns are recommended for local areas of serious insect and rodent infestation.

(8) Complete use of the range resources of northwestern Utah depends upon comprehensive development of livestock feed production on farm lands and seeding non-producing range lands and abandoned cultivated lands to forage grasses. Building a reserve supply of hay, concentrates, and pasture with which to supplement the range and with which to balance seasonal shortages is a basic requirement of a stabilized livestock industry. It is recommended, therefore, that livestock growers and land administering or supervising agencies adopt immediately as the first phase of range livestock improvement a comprehensive program for improving livestock feed conditions on both farm and range lands.

LIVESTOCK FEEDING SITUATION

(Continued from page 2)

kind of wheat is still available for restricted uses but how long it may remain available at less than the market price is not known. Recently concern has begun to find expression in some influential circles over the possibility of shortages in the supply of wheat for human consumption. While the feed-wheat situation is largely a political problem it is quite probable that from the feeders' point of view it will be less favorable than it has been the past couple of years.

A strong demand for livestock feed is in evidence all over the nation. Probably the Utah situation is more favorable than the average of the nation as a whole in comparing the present with the past. This may also add to the difficulty of maintaining normal import-export relationships.

The National Protein Situation

During the past summer the most serious feed problems in the state were

in connection with shortages of high protein content feeds. Some of these problems still exist though they are not so serious as they were. However, many producers are fearful lest this situation be worse during the coming year. These local shortages were probably attributable as much or more to physical and economic barriers to the free movement of feeds as to absolute shortages and there is no assurance that such barriers have been or will be removed. However, present indications are that some improvement has been made which will probably continue.

According to a Bureau of Agricultural Economics report published in the August 1943 issue of "The Agricultural Situation," the 1943-44 supply of protein feeds for the nation is estimated at 134 pounds per animal unit as compared to 140 pounds for the average of the 1937-41 period. This represents a decrease of 4.3 percent which should not be at all serious provided the supply is well distributed. Included in this estimate was an anticipated 10 percent increase in total livestock numbers on

January 1, 1944 over January 1, 1943.

Other Factors

In basing a consideration of the adequacy of the feed supply for the coming year on a comparison with the past, several additional factors should not be overlooked. Among these are: (1) The year to year variation in the amount of feed required for many livestock because of differences in the length and severity of the winter; (2) The recent trend toward more intensive feeding of livestock, especially of dairy cattle, hogs, and chickens. This has resulted, in part at least, from (3) The favorable relationships that have prevailed during the past few years between feed prices and the prices of livestock and livestock products. While feed-product price relationships are in general not so favorable to the producer now as they have been they are still relatively favorable, and (4) The favorable production of feed crops, condition of pastures, ranges, and range livestock, this year extends generally to every major part of the state.

SAMPLING OF WOOL

(Continued from page 5)

weight, average scoured weight, and the average shrinkage of the fleeces in each group. The results are shown in table 3.

Sheep breeders have long thought that to increase the length of staple, density of fleece must be sacrificed, resulting in lighter fleece weights. No one will deny the fact that in two sheep of equal size, other characteristics being equal, the one with the greater density will produce the heavier fleece. It has been proved, however, that these two characteristics are not necessarily antagonistic to each other. Similarly, data in table 3 show that as staple length is increased the scoured weight of fleece is also increased and the shrinkage is lowered. By increasing staple length the wool grower will possibly benefit himself in two ways: (1) by increasing his production of wool on a scoured basis, and (2) by producing the more valuable combing wool as compared with the less valuable, short-stapled clothing wool. Even though density may be sacrificed the loss of production through this cause is more than compensated by an increase in length of staple.

The purpose of the above phases of the 1943 wool studies has been twofold: (1) To determine the shrinkages of commercial wool clips. By returning such information to the wool grower it is hoped that it will be a valuable aid to him in his marketing program as well as serve as a guide toward the production of improved wool clips. (2) To supply information to the purebred breeders that will aid in the selection of higher producing sheep. The result of such a program will be reflected in the purebred breeder supplying the range sheep men with rams that are capable of siring high producing range ewes.

Bliss H. Crandall, assistant professor of agronomy and Station statistician, accepted the position of associate agronomist with the U. S. Bureau of Plant Industry, Soils and Agricultural Engineering. He has charge of alfalfa investigations in the western states and is stationed at Lincoln, Nebraska.

Dr. Rue Jensen, assistant professor of veterinary science stationed at the Branch College, has resigned to accept the position of associate professor in the veterinary school at Colorado State College.

Mrs. Almeda P. Brown, research associate professor of home economics, has been made acting dean of the School of Home Economics while Dean Christine B. Clayton is away on leave.

Table 1. Range in shrinkage of wool from samples from 25 herds by grades

Grade	No. of samples	Range of shrinkage		Average
		High	Low	
Fine	24	71.6	55.3	65.7
1/2 blood	16	65.9	45.3	59.3
3/8 blood	10	63.8	51.9	57.9
1/4 blood	3	60.6	58.1	59.1

Table 2. Variation in grease weight, scoured weight, staple length, and shrinkage in purebred flocks

Flock no.	1	2	3	4
No. of sheep	199	60	72	42
Grease wt. of fleece				
High	25.0	21.6	13.2	17.8
Low	6.4	9.8	6.2	10.5
Average	12.6	15.2	9.2	12.9
Scoured wt. of fleece				
High	10.4	10.7	5.9	7.7
Low	2.1	5.0	3.3	4.7
Average	4.1	6.8	4.1	6.0
Staple length				
Long	3.5	4.2	3.8	3.8
Short	1.3	2.3	2.2	2.1
Average	1.7	3.0	2.6	2.7
Shrinkage				
High	76.4	63.9	66.4	60.6
Low	48.9	46.9	41.9	43.1
Average	65.3	54.1	54.6	53.8

Table 3. Comparison in production based on staple length

Item	Unit	Flock no.			
		1	2	3	4
Staple length	inches				
Avg. of 10 longest		3.0	3.6	3.4	3.4
Avg. of 10 shortest		1.4	2.4	2.3	2.1
Difference		1.6	1.2	1.1	1.3
Grease weight	pounds				
Avg. of 10 longest		15.8	14.9	9.4	14.4
Avg. of 10 shortest		11.9	16.0	9.9	12.5
Difference		3.9	1.1	0.5	1.9
Scoured weight	pounds				
Avg. of 10 longest		6.1	7.3	4.9	6.5
Avg. of 10 shortest		3.1	6.4	3.7	5.5
Difference		3.0	0.9	1.2	1.0
Shrinkage	percent				
Avg. of 10 longest		74.0	59.8	62.3	55.3
Avg. of 10 shortest		61.8	50.7	48.1	55.0
Difference		12.2	9.1	14.2	0.3

NEW POISONOUS WEED

(Continued from page 3)

losses have been attributed to halogeton poisoning.

The oxalic acid is not at all cumulative and small amounts of the plant can be consumed day after day without any ill effects. As has already been pointed out, losses usually occur in the fall and then most likely when the sheep are being trailed to the winter range. A hungry animal which is allowed to fill on halogeton containing oxalates as high as 20 percent of the dry weight of the plant can be expected to die within a few hours.

To cope successfully with this new range menace seems to be entirely a

problem of range management practices. The weed will not crowd out good stands of native forage plants. It is only along bare roadsides and where native vegetation has been killed out by overgrazing, erosion or other causes that halogeton spreads. From distribution studies it appears economically unsound to attempt to eradicate such a vigorous, aggressive plant which already covers thousands of acres in three states. By maintaining and improving our ranges we can hope to keep halogeton along the roadsides. And if livestock men learn to recognize the plant and avoid it entirely through the critical fall period, losses from halogeton poisoning will be practically eliminated.

TODAY it is more important than ever for the housewife to see that her family is well fed. As she works out plans for an adequate diet with the foods now available, she finds that she needs to know which foods will furnish the essential nutrients and some of the functions of these nutrients. To help solve some of these problems let us discuss vitamin A.

Severe vitamin A deficiencies are not common in this country, but there is reason to believe that many persons are suffering from a mild deficiency. In children this condition is characterized by retarded growth and improper development of teeth and bones. In adults night blindness or difficulty in distinguishing objects at dusk or in the dark is a common sign of a diet low in the vitamin. The person may be unaware of his difficulty. Thus there is a report of an automobile driver who had had six accidents, with loss of life. He was found to be a skillful driver. However, the accidents occurred at night. A test of his ability to see in dim light showed it to be subnormal. Vitamin A therapy cured his difficulty.

A more severe deficiency results in a change in the epithelial cells present in skin tissue and in the mucous linings of the mouth, the alimentary and respiratory tracts, the bladder and the kidneys. The normal healthy cells atrophy and are replaced by a stratified, cornified epithelial cell in which the original secretory function of the cell is lost. Bacteria then lodge on the surface and multiply in great numbers. A secondary infection follows which is most common in the upper respiratory tract and urinary tract.

A dermatosis may develop on the skin which is characterized by tiny pus-filled eruptions on many parts of the body.



Miss Wilcox holding one of the rats used in vitamin feeding tests

VITAMIN A IMPORTANT IN MAINTAINING HEALTH

Adequate Amounts of this Vitamin Found in Available Foods

By ETHELWYN B. WILCOX

The skin is usually rough, dry and wrinkled, and there is an absence of sweat.

When vitamin A is completely lacking in the diet, xerophthalmia develops in the eye. Ulceration of the cornea and complete destruction of the eye may occur. Symptoms in mild cases are itching, burning, eye-strain and slight photophobia or sensitivity to strong light.

The first experiments to determine the amount of vitamin A in a food were performed by feeding animals. Rats were used as the test animals and the quantity of a food that cured the symptoms of the deficiency was determined by feeding tests. A small daily dose of a vitamin-rich food or a larger feeding of a less potent source would cure the animals. Now, the nutritionist can make the more rapid chemical analysis of the amount of vitamin A or its precursor, carotene, in a food. The development of the chemical technique permitted studies on the effect of cooking, storing, freezing and canning on the carotene or vitamin A content of food. The Utah Agricultural Experiment Station

is cooperating with the experiment stations in the other states in determining the carotene content of fresh and processed vegetables and fruits.

It is so easy to obtain an adequate amount of vitamin A in the diet that any deficiency is unnecessary. The animal organism is unable to synthesize vitamin A in the body. Its supply of the vitamin must come from animal tissue containing vitamin A or from the plant precursors, the carotenes, which are converted into vitamin A in the liver.

In fruits and vegetables, color (green and yellow) is an index of the amount of carotene or potential vitamin A present. It is a safe guide to select the yellow or green variety of a vegetable instead of the white variety. The difference in vitamin content of some colored vegetables is shown in table 1. All green leafy vegetables are excellent sources of the vitamin. Apricots are a yellow fruit especially high in carotene. In the animal products such as eggs and milk, the color does not indicate the vitamin A content because the color depends upon the pigments in the ration which may or may not be convertible into vitamin A. Liver and kidney are excellent sources and butter, cream, eggs and whole milk are good sources of vitamin A. The fish liver oils are excellent sources of the vitamin.

The unit of measure of the vitamin A activity of a food is the International Unit. The recommended daily allowance for the average adult is 5,000 I.U.

Because vitamin A is soluble in fats and not in water there is little loss by solution in cooking. At ordinary cooking temperatures vitamin A is comparatively stable. However, rancid fats will cause destruction of the vitamin.

Table 1. Vitamin A activity of some common vegetables and fruits

Food	International units per 100 grams
Celery, green	2,100
bleached	20
Lettuce, green	6,000
iceberg	175
Squash, Hubbard	7,000
summer	400-1,400
Potatoes, sweet	3,500
white	30
Sweet corn, yellow	600
white	0-50
Peaches, yellow	3,500
white	30

Table 2. Distribution of Vitamin A in foods

Food	International units per 100 grams
Green leaves such as kale, spinach, turnip greens	13,000-27,000
Vegetables:	
broccoli	3,000-9,000
carrots	2,200-4,000
sweet potatoes	1,500-3,500
tomatoes	500-2,500
Apricots, fresh	3,000-8,000
Liver	5,000-10,000
Butter	3,500-5,000
Cream	1,000-2,500
Cheese	1,200-1,500
Whole milk	160-225